MULTIMEDIA UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

DCS5038 – PROGRAM DESIGN

(DIT & DBIS)

3 MARCH 2018
2:30 p.m. – 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS:

1. This question paper consists of **9** pages with **5** questions.
2. **SECTION A**: Answer **ALL** questions.
3. **SECTION B**: Answer **ONLY ONE (1)** question.
4. Please print all your answers in the Answer Booklet provided.

SECTION A(75 Marks)

Instruction: *Answer **ALL** questions from this section and write your answers in the answer booklet provided.*

QUESTION 1 (25 Marks)

a. Based on the description given below, draw the **flowchart** for Pay Bill System. [13 marks]

- Initialize all the required variables.
- Use *while loop* to repeat the following instructions:
  - Get the input *menu* from the user.
  - Get the input *amount* from the user.
  - Set the *subsidy* based on the following table.

Menu	Subsidy
1	10.00
2	15.00
3	8.00
Other	0.00

  - Calculate the *total* based on the formula given:
    $$total = amount - subsidy$$
  - Calculate the *grand total* based on the formula given:
    $$grand\ total = grand\ total + total$$
  - Display the *subsidy* and *total.*
  - Repeat the process by asking user to continue or to terminate the program.
- Display the *grand total.*

Sample Output

```
Menu: 1. TM      2. TNB   3. Astro
Enter code menu: 1
Enter amount: 125
Subsidy :10.00
Total :115.00
Do you want to continue: Y

Menu: 1. TM      2. TNB   3. Astro
Enter code menu: 2
Enter amount: 112
Subsidy :15.00
Total :97.00
Do you want to continue: Y

Menu: 1. TM      2. TNB   3. Astro
Enter code menu: 3
Enter amount: 98.21
Subsidy :8.00
Total :90.21
Do you want to continue: N

Grand Total: 302.21
```

b. Based on the description given in (a), write the **pseudocode.** [12 marks]

Continued...

QUESTION 2 (25 Marks)

a. Trace the output of the following code segment. [5 marks]

```
int main()
        {
        int a = -4, b = 8, c=0;

            c =  a++ + --b;

            printf("%d %d %d", a,b,c);
            printf("\n%d", ++a + c-- *b);
            printf("\n%d", --b + a % ++c);
        }
```

b. Write a complete program to identify the gift redemption for a customer. [14 marks]

- Prompt the user for membership status.
- If the user has membership, ask user to key in the collected points.
- Otherwise, display a message *"Please register as a member"* and exit the program.
- Else, display a message *"The selection is invalid"* and exit the program.
- Use *nested if-else* statement to determines the gift redemption that would be given based on the table below:

Code	Points	Gifts
Y or y	500 to less than 2000	Umbrella
	2000 to less than 4000	Rice Cooker
	4000 or more	Luggage
	Else	Not available
N or n	Display "*Please register as a member*"	
Others	Display "*The selection is invalid*"	

Sample Output

```
Are you a registered member [Y/N]: Y
Enter your collected points: 3500
Hi, your gift is Rice Cooker.
```

```
Are you a registered member [Y/N]: N
Please register as a member.
```

```
Are you a registered member [Y/N]: A
The selection is invalid.
```

Continued...

c. Evaluate whether the following expressions are **TRUE** or **FALSE**. Show your workings. *(Note: The expressions are not related to each other.)*

Declaration: `int h = 6, i = 2, j = 1, k = 4;`

i. `h % 4 + 4> 3 || i + 4 * j == 7` [3 marks]

ii. `k / i + h <10 && !(h+1<3)` [3 marks]

QUESTION 3 (25 Marks)

a. Based on the following descriptions and sample output, write the code segments to determine the total number of students eligible for Industrial Training Program based on the credit hour already taken.
In the *main()* function,

- Declare an **array** called *creditHour* with size 5 and int variable *i* (as counter). [1 mark]
- Use *for* loop to get the *creditHour* input for 5 users. [1.5 marks]
- Call function *check(...)* and pass *creditHour* as parameter. [1 mark]

In function *check(...)*:

- Use *for* loop to display the total number of students who are eligible i.e. credit hour must be at least 40. [3.5 marks]

Sample Output

```
----------------ITP-----------------
Enter credit hour for student #1: 44
Enter credit hour for student #2: 42
Enter credit hour for student #3: 50
Enter credit hour for student #4: 38
Enter credit hour for student #5: 40

Total eligible students: 4 students
```

b. Trace the output for the following program. [4 marks]

```
int array[6] = {-10, -5, 0, 5, 10, 15};
int *m, *n;

m = &array[1];
printf("\n%d", *m + 4);
printf("\n%d", *(m + 4));

n = &array[3];

printf("\n%d", *m - *n);
printf("\n%d\n", *(--n) - *m);
```

Continued...

c. Based on the following descriptions and the sample output screen, write the code segments for (i) to (iii).

i. Create a **structure** called *Subject*. It contains the *code* (string), *creditHour* (int) and *fee* (float) as members. [3 marks]

ii. In function *main()*: [2 marks]
- Create a structure variable called *programming* **initialized** with the following values.
  - *code: DCS5050*
  - *creditHour: 4*
  - *fee: 500.00*
- Call function *display(...)*, passing the structure *programming* as argument.

iii. For function *display(...)*: [3 marks]
- Write the function header for *display(...)*.
- Write the code to display all the values stored in (ii).

Sample Output

```
Subject's code        : DCS5050
Subject's credit hour : 4
Subject's fee         : RM 500.00
```

d. Write a program that read and display the list of students who are eligible for Dean's List based on the Grade Point Average (GPA) of at least 3.67, stored in the file ***gpa.txt*** below.

[6 marks]

Content of gpa.txt

```
MU14101 2.50
MU16107 4.00
MU17111 2.00
MU17119 3.90
MU17122 3.55
MU17122 3.23
```

Sample Output

```
Student ID      GPA
----------      ----
MU16107         4.00
MU17119         3.90
```

Continued...

SECTION B (25 Marks)

Instruction: *Choose and answer* ***ONLY ONE (1)*** *question from this section and write your answers in the answer booklet provided.*

QUESTION 1 (25 Marks)

Write the **complete C program** for a company to take orders of smartphone shipment from its retailers.

Create a structure called ***ORDER*** with *retailerID, retailerName, phoneModel* (string), *phoneCode* (int), *payment* and *discount* (float) as members.

In function *main()*:

- Declare a structure variable array called *retailer* with size 3.
- Using *do while* loop, repeat the following steps for 3 retailers:
    - Ask the user to enter the *retailer's ID, retailer's name, phone code* and number of *units* required.
    - Using *while* loop, request user to re-enter if units ordered are less than 50.
    - Call function *getPrice(...),* passing the *phone code* as argument.
    - Call function *getDiscount(...)*, passing the *units* ordered as argument.
    - Determine the *payment* using the formula;

$$(price\ x\ units) - discount\ amount$$

    - Call function *displayReport(...)*, passing the structure array *retailer* as argument.

In function *getPrice(...)*:

- Using *switch-case* statement, identify and return the *price* for the smartphone based on the *phone code*.

Phone code	Price
1	RM 2,599.00
2	RM 1,899.00
3	RM 1,999.00
4	RM 3,999.00

In function *getDiscount(...)*:

- Using *if-else* statement, identify and return the *discount percentage* that the retailer is entitled to, based on the units ordered.

Units	Discount (%)
Less than 100	0.0
Less than 300	2.5
Less than 500	5.0
500 or more	10.0

Continued...

In function *getModel(...)*:

- Using *switch-case* statement, identify and return the *model* for the smartphone based on the *phone code*.

Phone code	Model
1	Galaxy S8
2	Galaxy A9
3	Galaxy C9
4	Note8

In function *displayReport(...)*:

- Using *for loop*, display the *retailer's ID, retailer's name, phone model, discount percentage* and the *payment* amount as shown in the sample output screen below.

Sample Output

```
Code    Model
1.      Galaxy S8
2.      Galaxy A9
3.      Galaxy C9
4.      Note8

Enter retailer's ID     : X7705
Enter retailer's name   : Maxis Maju
Enter phone code        : 1
Enter number of units   : 300

Enter retailer's ID     : X9903
Enter retailer's name   : Celcom Cool
Enter phone code        : 4
Enter number of units   : 20

        Minimum order is 50 units!
        Enter number of units   : 50

Enter retailer's ID     : X5501
Enter retailer's name   : Digi Dash
Enter phone code        : 2
Enter number of units   : 500

Order Summary
--------------------
Retailer's ID & name    : X7705 (Maxis Maju)
Phone model             : Galaxy S8
Discount                : 5.00 %
Payment                 : RM 740715.00

Retailer's ID & name    : X9903 (Celcom Cool)
Phone model             : Note8
Discount                : 0.00 %
Payment                 : RM 199950.00

Retailer's ID & name    : X5501 (Digi Dash)
Phone model             : Galaxy A9
Discount                : 10.00 %
Payment                 : RM 854550.00
```

Continued...

QUESTION 2 (25 Marks)

Write a **complete C program** that calculates the total payment for school registration. Given is a text file named *schoolinfo.txt* that contains school registration information.

Contents of *schoolinfo.txt [before execution]*

<code>	*<monthly fee>*	*<discount>*	*<total payment>*
1	500.00	100.00	400.00
2	600.00	120.00	480.00
3	700.00	140.00	560.00

In function main() :

- Declare all necessary variables.
- Create file pointer name: *filepro*.
- Open the file *schoolinfo.txt* for appending.
- If the file *schoolinfo.txt* doesn't exist, display "*The file cannot be opened!*", else use *do while loop* to:
  - Prompt user to enter *code* of school years.
  - Call function *get_monthly_fee(...)*, passing *code* as parameters. The function calculates the *monthly fee* value.
  - Prompt user to enter *status of registration*.
  - Call function *get_discount(...)*, passing *status of registration* and *monthly fee* as parameters. The function calculates the *discount* value.
  - Calculate *total* of payment based on the following formula:

    total payment = monthly fee - discount
  - Write the *code, monthly fee, discount* and *total payment* into file *schoolinfo.txt* as shown below.

Contents of *schoolinfo.txt [after execution]*

<code>	*<monthly fee>*	*<discount>*	*<total payment>*
1	500.00	100.00	400.00
2	600.00	120.00	480.00
3	700.00	140.00	560.00
2	600.00	120.00	480.00
3	700.00	0.00	700.00
1	500.00	100.00	400.00
1	700.00	0.00	700.00

  - Repeat the process by asking user to continue or to terminate the program.

- Call function *rewind(...)* to sets the file position at the beginning of the file stream.
- Use a *while loop* to read each record until the end of the file.
  - Read the *code, monthly fee, discount* and *total payment* from the file.
  - Display the *code, monthly fee, discount* and *total payment* as shown in the sample output.
- Close file pointer *filepro*.

Continued...

In function *get_monthly_fee(...)*:

- Declare a prototype for this function.
- If *code* is equal to 1, prompt user to enter *admission status* to determine the *monthly fee*. If *code* is equal to 2 and 3 set the *monthly fee* accordingly based on the following table.

Code	Admission status	Monthly Fee
1	"regular"	500
	"extended"	700
	other	0
2	-	600
3	-	700
other	-	0

- Return the *monthly fee* value.

In function *get_discount(...)*:

- Declare a prototype for this function.
- Determine the *discount* based on the following table.

Status of registration	Discount rate
1	0.2
other	0

- Calculate the *discount* based on the following formula:

$$discount = discount\ rate\ x\ monthly\ fees$$

- Return the *discount* value.

Sample Output

```
1. Preschool(4-6 years)
2. Lower Grade(7-10 years)
3. Upper Grade(11-12 years)

Enter code years: 2
Enter registration code [1 for 1st Registration, 2 for Second and Above]: 1
Enter Y/y to continue: Y

1.Preschool(4-6 years)
2.Lower Grade(7-10 years)
3.Upper Grade(11-12 years)

Enter code years: 3
Enter registration code [1 for 1st Registration, 2 for Second and Above]: 1
Enter Y/y to continue: Y

1.Preschool(4-6 years)
2.Lower Grade(7-10 years)
3.Upper Grade(11-12 years)

Enter code years: 1
Enter admission status [regular or extended]: regular
Enter registration code [1 for 1st Registration, 2 for Second and Above]: 1
Enter Y/y to continue: Y
```

Continued...

```
1.Preschool(4-6 years)
2.Lower Grade(7-10 years)
3.Upper Grade(11-12 years)

Enter code years: 1
Enter admission status [regular or extended]: extended
Enter registration code [1 for 1st Registration, 2 for Second and Above]: 1
Enter Y/y to continue: Y

Code    Monthly Fee   Discount     Total Payment
1         500.00      100.00        400.00
2         600.00      120.00        480.00
3         700.00      140.00        560.00
2         600.00      120.00        480.00
3         700.00        0.00        700.00
1         500.00      100.00        400.00
1         700.00        0.00        700.00
```

End of Paper.